

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Smith et al
Serial No. 10/699,205
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Examiner: Sastri, Satya B.
Art Unit: 1713

For: **SUPERABSORBENT POLYMER WITH HIGH PERMEABILITY**

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
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AFFIDAVIT UNDER 37 C.F.R. 1.132

I am Mark Joy. I hold a BS in Chemistry from Ferrum College and MS in Biology from Tennessee Technological University and specialized in the area of Emerging Pathogens. I started working in the field of superabsorbent polymers as a research intern in 1995, and upon completion of my MS was hired in 1998 and continued working in this field to the present. Since May 18, 1998, I have been employed as a Product Development Chemist by Stockhausen Inc. located in Greensboro, NC. My current position is Supervisor of the Scale-up Laboratory for Absorbent Technologies.

I have reviewed U.S. Patent No. 6,107,358 to Harada et al. and prepared superabsorbent polymer substantially similar to the procedure set forth in Example 25 and those set forth in Example 18, and added precipitated silica to the surface as set forth in the following;

Superabsorbent Prepolymer A was prepared according to the following procedure, which was substantially similar to Example 25 of Harada et al.

An aqueous monomer solution was prepared by mixing 118 g of acrylic acid, 0.3787 g of methylene bis-acrylamide, 0.059 g of a fluorine based cationic surfactant (supplied by Mason Chemical Company and marketed under trademark designation of "Masurf FS-1620"), 7.07 g of

an aqueous 5% V-50 (produced by Wako Pure Chemical Industries, Ltd.) solution, 5.9 g of an aqueous 0.1% L-ascorbic acid solution, and 401.4 g of deionized water. This aqueous monomer together with nitrogen gas was subjected to fluid mixing by gas injection via a sparge system to obtain an aqueous monomer solution having nitrogen gas dispersed therein. Subsequently, 0.66 g of an aqueous 35% hydrogen peroxide solution was added to the aqueous monomer solution to initiate polymerization of the monomer. Then, the ensuing stationary polymerization was continued at a temperature in the range of 25° to 80°C for 1 hour with bubbles dispersed therein. The hydrogel polymer resulting from the polymerization and having a large volume of bubbles dispersed therein was disintegrated with a twin-arm kneader/extruder. The disintegrated hydrogel polymer was extracted from the kneader, neutralized in a vat with 755.8 g of an aqueous 6.5% sodium hydroxide solution, and left aging until the neutralization was homogenized and the coloring reaction with phenol phthalein vanished. The ratio of neutralization of the carboxyl group contained in the hydrogel was 75%. The gel resulting from the neutralization was dried in a hot air drier at 160°C for 1 hour and pulverized to obtain Superabsorbent Prepolymer A. The capacity for water absorption for the Superabsorbent Prepolymer A was found to be 58.5g/g.

Superabsorbent polymer B was prepared according to the following procedure, which was substantially similar to Example 27 of Harada et al.

Superabsorbent Polymer B was obtained by preparing a solution of a cross-linking agent containing 0.3 grams of ethylene glycol diglycidyl ether (supplied by CVC Specialty Chemicals Inc. and marketed under trademark designation of "ERISYS EGDGE"), 3 grams of propylene glycol, and 3 grams of isopropyl alcohol by mixing these ingredients together and then spraying the solution on 100 grams of the Superabsorbent Prepolymer A to form a wetted Superabsorbent Prepolymer A. Then a second solution was prepared including 9 grams of water and 6 grams of

isopropyl alcohol and the second solution was sprayed onto the wetted Superabsorbent Prepolymer A to form a treated Superabsorbent Prepolymer A, which was heat-treated at 185°C for 60 minutes. 3 grams of an aqueous 0.33% polyoxyethylene sorbitan monostearate (produced by Kao Co., Ltd. and marketed under trademark registration of Rheodol TW-S120) methanol solution was sprayed onto the heat treated Superabsorbent Prepolymer A and the resultant product was dried at 80°C for 1 hour to form Superabsorbent Polymer B.

The superabsorbent polymer B of the foregoing procedure was measured for the following properties in accordance to the test procedure set forth for each of the properties in the present application:

Gel Bed Permeability (GBP): $7 \times 10^{-9} \text{cm}^2$

Centrifuge Retention Capacity (CRC): 40g/g

Absorption Against Pressure at 0.7psi (AAP(0.7psi)): 9.3g/g

Gel Strength (G'): 2745dynes/cm²

I calculated the numeric value GBP according to $[54000e^{-0.18x} + 75] \times 10^{-9} \text{cm}^2$ as set forth in Claim 2 of the present application for Superabsorbent Polymer B and found the numeric value of GBP for Superabsorbent Polymer B to be $115.3 \times 10^{-9} \text{cm}^2$.

Superabsorbent Polymer C was prepared according to the following procedure:

With regards to silica addition, a Superabsorbent Polymer C was obtained by preparing a solution of a cross-linking agent containing 0.5 grams precipitated silica (produced by Degussa Corp. and marketed under the trademark designation of "Sipernat 22S"), 0.3 grams of ethylene glycol diglycidyl ether (supplied by CVC Specialty Chemicals Inc. and marketed under trademark designation of "ERISYS EGDGE"), 3 grams of propylene glycol, and 3 grams of isopropyl alcohol by mixing these ingredients together and then spraying the solution on 100 grams of Superabsorbent Prepolymer A. Then a second solution was prepared including 9 grams

of water and 6 grams of isopropyl alcohol and the second solution was sprayed onto the wetted Superabsorbent Prepolymer A to form a treated Superabsorbent Prepolymer A, which was heat treated at 185°C for 60 minutes. 3 grams of an aqueous 0.33% polyoxyethylene sorbitan monostearate (produced by Kao Co., Ltd. and marketed under trademark registration of Rheodol TW-S120) methanol solution was sprayed onto the heat treated Superabsorbent Prepolymer A and the resultant mixture was dried at 80°C for 1 hour to form Superabsorbent Polymer C.

Superabsorbent Polymer C of the foregoing procedure was measured for the following properties in accordance to the test procedure set forth for each of the properties in the present application:

Gel Bed Permeability (GBP): $16 \times 10^{-9} \text{ cm}^2$

Centrifuge Retention Capacity (CRC): 41.8 g/g

Absorption Against Pressure at 0.7psi (AAP(0.7psi)): 8.4 g/g

Gel Strength (G'): 2149 dynes/cm²

I calculated the numeric value GBP according to $[54000e^{-0.18x} + 75] \times 10^{-9} \text{ cm}^2$ as set forth in Claim 2 of the present application for Superabsorbent Polymer C and found the numeric value of GBP for Superabsorbent Polymer C to be $104.2 \times 10^{-9} \text{ cm}^2$.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001; and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.


Mr. Mark Joy

Date: 5/31/06